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BA/EN
WR MT
Mail Stop 60190

Memorandum

To: ARD,
Atten

From: Regional Engineer, Region 6

Subject: 1989-1990 Annual Water Use Report/Management Plan

The subject report for Medicine Lake National Wildlife Refuge has been reviewed and approved.

Please extend our thanks to Refuge personnel for the submission of this report.

② Since the source filed for a change of water right to cover the lower canyon and lake level. That project, he is not legally allowed to store water in medicine lake above 1935.77. Once the water level reaches that elevation, the water control structure at Dam No. 4 should be opened. After that, water until the water begins to flow over the spillway. (See pg. 17)

bcc: EN rf
Circ rf (2)
EN:LCoe:lc:4-25-90

① The request for assistance in developing area capacity tables for refuge improvements is noted. We will be in contact once we've reviewed projects and funding for next year.

Refuge Manager
should check
w/ Assoc. Mgr.
re funding

Funding need should be brought to the attention of the Assoc. Mgr.

② As explained in a recent telephone discussion with the Refuge Manager, the Dept. of Justice attorney refused to file the amended water rights claims because he felt the court would interpret them as lake claims. However, regardless of whether the court claims the water court decision, the source will not lose who never had a claim. The source is able to prove.

Initial	Date
CW	8-8-90
WAS	8/8/90
LC	8/8/90

BA/EN
WR MT
Mail Stop 60190

AUG 09 1990

Memorandum

To: ARD, Refuges and Wildlife (60130)
Attention: Barney Schranck

From: Regional Engineer, Region 6

Subject: 1989-1990 Annual Water Use Report/Management Plan

The subject report for Medicine Lake National Wildlife Refuge, Lamesteer NWR and NE Montana WMD have been reviewed.

1. The request for assistance in developing area-capacity tables for Refuge impoundments is noted. We will be in contact once we've reviewed projects and funding for next year. Additional funding from RW may be required.
2. As explained in a recent telephone conversation with the refuge manager, the Department of Justice attorney refused to file the amended water rights claims because he felt the Court would interpret them as late claims. However, regardless of what set of claim forms the Water Court reviews, the final decree will reflect whatever historic use the Service is able to prove.
3. Since the Service filed for a change of water right to cover the Sayer Bay and Lake Creek Flats projects, we are not legally allowed to store water in Medicine Lake above 1935.77. Once the water level reaches that elevation, the water control structure at Dam No. 4 should be opened rather than waiting until the water begins to flow over the spillway. (see pg 17.)

Please extend our thanks to Refuge personnel for the submission of this report.

/s/ WILLIAM A. DUNN

bcc: EN rf
Circ rf (2)
EN:LCo:lc:8-07-90

UNITED STATES GOVERNMENT

MEMORANDUM

DATE: 6 April 1990
TO: Regional Hydrologist
THRU: Associate Manager, Zone I, Refuges & Wildlife
FROM: Refuge Manager, Medicine Lake National Wildlife Refuge
SUBJECT: 1989/90 Water Use Report/Management Plans

Attached is the subject reports for Medicine Lake NWR, Lamesteer NWR, Carlson WPA, and Johnson Lake WPA.

Preparation of the Medicine Lake Plan was delayed somewhat by a lack of some of the data we needed and changes we made in 1989 in the way we track our water use.

One problem we ran into in preparing the report was the lack of good area and capacity tables for several refuge lakes. If it is possible, I would like to work with you to develop tables for all refuge impoundments. Currently we have good area/capacity tables only for Medicine Lake and Sayer Bay. Having these tables for all water units would help us considerably in determining our annual water needs.

If you have any questions about the report, please call.

Jim McCallum

APR 9 1990

MEDICINE LAKE NATIONAL WILDLIFE REFUGE

MEDICINE LAKE, MONTANA

ANNUAL WATER MANAGEMENT REPORT/PLAN

1989 WATER USE REPORT

1990 MANAGEMENT RECOMMENDATIONS

UNITED STATES DEPARTMENT OF INTERIOR

FISH AND WILDLIFE SERVICE

Submitted: James E McCallum Date: 4/5/90
Refuge Manager

Reviewed: Bonnie W. Schumacher Date: 4/17/90
Associate Manager, Division I

Reviewed: _____ Date: _____

Reviewed: _____ Date: _____

I. 1989 WATER USE REPORT

A. General

Contrary to rumor the 1980s drought did not end in northeastern Montana in 1989. The extremely hot temperatures experienced in 1988 did not recur this year, but, the weather was somewhat warmer than normal and much dryer than average. Total precipitation was 9.88 inches compared to the annual average of 14.3 inches.

Although the 22,719.5 acre feet of water diverted in 1989 was substantially more than the 122 acre feet received in 1988, it was still much below the amounts needed to fill all refuge lakes. Fortunately there was sufficient water to fill several of the small management units on the refuge. The result was that the refuge achieved fairly good waterfowl production even though overall water conditions remained below normal.

Most of the stream flow this year can be attributed to one storm that occurred in mid-January. It dropped over a foot of snow that remained in drifts until snow melt began in mid-March.

On January 1, 1989, the refuge water deficit was 40,781 acre feet. Table 1 indicates the 1989 deficit by lake with comparison to other recent years. Table 2 compares 1989 water deficits with stream flow, diversions, and releases.

Table 1

COMPARISON OF WATER DEFICITS IN ACRE FEET BY LAKE
ON JANUARY 1

LAKE NAME	CAPACITY #	1989	1988	1987	1986	1985
MEDICINE	88,290	24,185	(@)	(@)	17,797	16,957
HOMESTEAD	8,216	7,509	5,602		6,938	7,552
12	2,500*	1,580	(@)		2,396	1,821
KATY'S	1,850*	1,850			1,170	1,850
11	497*	438			497	438
10	1,150*	904			319	452
DEEP	450*	376			378	378
SAYER	787	711			425	595
GAFFNEY	4,694	2,851			3,222	1,998
LONG	377*	377			215	215
TOTALS		40,781	(@)	(@)	33,357	32,256

at management elevations

* amounts are estimates based on surface acres & approx avg. depth.

@ deficits not available for these years

Table 2.

SUMMARY OF WATER DEFICITS, DIVERSIONS & RELEASES
IN ACRE FEET

YEAR	WATER DEFICIT JANUARY 1	WATER DIVERTED	WATER RELEASED	WATER DEFICIT DECEMBER 31
1989	40,781	22,719.5	2,745	37,842
1988	*	122.0	1,000	40,781
1987	*	9,316.0	7,123	*

*information not available

B. Water Rights

On November 7, 1936, the Bureau of Biological Survey filed Notices of Appropriation of water for use on the refuge. Table 3 indicates sources and water appropriations by stream.

Table 3.

WATER APPROPRIATIONS BY STREAM
AT MEDICINE LAKE NWR

<u>Source</u>	<u>Amount</u>
Big Muddy Creek (to Medicine Lake)	1,200 CFS
Big Muddy Creek (to Homestead Lake)	50 CFS
Cottonwood Creek	100 CFS
Sand Creek	75 CFS
Lost Creek	25 CFS
Sheep Creek	20 CFS
Lake Creek	100 CFS

In 1970 an additional appropriation of 300 CFS was made on Sheep Creek for Homestead Lake. Only in the filing on Big Muddy Creek for Medicine Lake was a total volume of water stated in the appropriations. That was for 55,000 acre feet.

Under the Montana Water Rights Adjudication Law, all water rights filed prior to 1973 had to be refiled before April 15, 1982. The refuge water rights were researched and filed by the Region 6 Engineering, Water Resources section. Thirty applications were filed for a total of 146,715 acre feet of water prior to the deadline. Included were applications for all refuge stream diversions, water wells and small ponds.

Based on new information about lake capacities, annual evaporation and other factors, seven amended applications were filed requesting changes in points of diversion and in total acre feet claimed in 1988. These amendments were for the six streams which supply water to the refuge. The amendments have the effect of consolidating Service claims for specified amounts of water for each refuge impoundment. These are shown in Table 4.

No final action has been taken by the Montana Water Court on any of the applications the Service submitted for Medicine Lake Refuge.

Table 4.

1988 WATER RIGHTS APPLICATIONS AMENDMENTS

<u>Lake Name</u>	<u>Acre Feet Claimed</u>	<u>Contributing Streams</u>
Medicine Lake	155,248	Big Muddy, Lake, Sand & Cottonwood Creeks
Homestead	13,013	Big Muddy, Sheep, Lost Creeks
Lake 12	8,272	Lake Creek
Katy's Lake	5,313	Lake Creek
Lake 11	1,690	Lake & Cottonwood Creeks
Lake 10	3,537	Lake, Cottonwood & Sand Creeks
Gaffney Lake	6,206	Lake, Cottonwood & Sand Creeks
Deep Lake	3,500	Lake, Cottonwood & Sand Creeks
Long Lake	994	Lake, Cottonwood & Sand Creeks
TOTAL	184,760	

C. Actual Use

1. Type of Use

a. Stream Diversions

Total stream diversions in 1989 amounted to 22,719.5 acre feet. Table 5 displays this information.

Table 5.

1989 WATER DIVERSIONS BY STREAM AND LOCATION OF USE

SOURCE	ACRE FEET DIVERTED	LAKE WHERE USED	PERIOD OF DIVERSION
BIG MUDDY CRK	11,550.6 (1)	MEDICINE	MAR - DEC
BIG MUDDY CRK	5,550.0 (1)	HOMESTEAD	MAR - JUN
COTTONWOOD CRK	1,782.8 (1)	11, 10, SAYER, GAFFNEY	MAR - JUN
SAND CREEK	768.0 (1)	10, SAYER, GAFFNEY	MAR - MAY
LOST CREEK	650.0 (2)	HOMESTEAD	MAR - APR
SHEEP CREEK	1,200.0 (2)	HOMESTEAD	MAR - MAY
LAKE CREEK	1,218.1 (1)	12	MAR - JUN
TOTAL	22,719.5		

(1) as measured by USGS at stream gages

(2) diversion estimated by refuge staff

b. Discharges

Water discharged to Big Muddy Creek from Homestead Lake June 23 thru July 13 amounted to 2,560 acre feet. In November, 185 acre feet were discharged from Medicine Lake to Lake Creek. These two discharges totalled 2,745 acre feet. There were no discharges from Medicine Lake for use at Homestead Lake in 1989.

2. Wells

There were six water wells in use on the refuge in 1989. Table 6 indicates water use from those wells.

Table 6.

GROUND WATER USE FROM WELLS IN 1989

WELL NAME	LOCATION	PURPOSE	PERIOD OF USE	AMOUNT *
HEADQTRS # 2	Sec 33 T32N R56E	HOUSEHOLD & OFFICE USE	JAN - DEC	3.3 AF
HEADQTRS # 1	Sec 33 T32N R56E	YARD IRRIGATION	APR - NOV	4.7 AF
OIL WELL # 1-13	Sec 13, T32N R57E	INDUSTRIAL	JAN - DEC	0.7 AF
OIL WELL # 1-14	Sec 14, T32N R57E	INDUSTRIAL	JAN - DEC	0.7 AF
SANDHILLS # 1	Sec 17 T31N R57E	LIVESTOCK	MAY - SEP	0.3 AF
SANDHILLS # 3	Sec 20 T31N R57E	LIVESTOCK	MAY - SEP	0.4 AF
TOTAL				10.1 AF

* estimated acre feet used

D. Maintenance and Rehabilitation and Construction

In 1988 a survey team from Engineering, Region 6, resurveyed refuge lake elevations and bench marks and found that many elevations being used by the refuge were in error by seven feet or more when compared to US Geological Survey elevation data. In 1989 gages on most lakes were adjusted to conform with that new survey data. Table 7 compares old elevations with new elevations for refuge lakes. These corrections will not result in changes in amounts of water stored.

Ducks, Unlimited began a construction project at Homestead Lake in October. Work included dikes to separate Knudsen Bay from the northern portion of Homestead Lake and a new steel sheet piling stoplog water control structure to control discharges from Knudsen Bay. These structures will provide improved water management capability for the entire lake and should facilitate control of avian botulism outbreaks.

Table 7.

LAKE ELEVATIONS CHANGES DUE TO 1988 SURVEY

<u>Lake Name</u>	<u>Old Management Elevation</u>	<u>Corrected Elevation</u>	<u>Difference</u>
Medicine	1943.02	1935.85	-7.17'
Homestead	1937.65	1930.41	-7.24'
#12	1956.00	1948.51	-7.49'
Katy's	1954.40	1946.90	-7.50'
#11	1953.00	1945.53	-7.47'
#10	1945.80	1938.66	-7.14'
Gaffney	1945.00	1937.00	-8.00'
Deep	1945.80	1938.66	-7.14'
Long	1945.00	1937.00	-8.00'
Sayer Bay	1946.00	1938.66	-7.34'

One water control structure was rebuilt in 1989. The concrete and stoplog structure located on the canal between Gaffney Lake and Long Lake had deteriorated and had been unused for several years. A new concrete structure was built to replace the old facility. This new stoplog structure will provide control of water entering Long Lake from Gaffney Lake.

In mid-October the well which supplies domestic water to the refuge headquarters failed. Testing showed that the 85 foot deep well had been plugged with sand to the 55 foot level. Apparently the casing had perforated allowing sand to be drawn into the well. Carlson Drilling of Medicine Lake was contracted to drill a replacement well. The new well was drilled 15 feet east of the failed well to a depth of 88 feet. It produced excellent volumes of water during test pumping. The well was cased with five inch plastic pipe with ten feet of plastic screen in the water bearing zone.

E. Impoundment Data

As soon as ice breaks up on refuge lakes, water level gages are read and recorded. Gages are then checked at least weekly during spring run-off. After water levels stabilize, gages are checked monthly until lakes freeze up again in late fall.

Following is discussion of management for each of the ten refuge lakes and tables showing water levels throughout the season.

Medicine Lake

An action on water rights in 1989 affected the management level of Medicine Lake. The Service initiated a request to Montana State Water Office for a change in place of use for 804 acre feet of water. The Sayer Bay water unit and several duck breeding pair ponds built by Ducks Unlimited in Lake Creek flats needed a water allocation. To accommodate this need, 804.16 acre feet of water was reallocated from Medicine Lake to these units. This had the effect of lowering the Medicine Lake management level by 0.08 foot,

which changed the management level from 1935.85 to 1935.77 MSL.

Diversions into Medicine Lake from Muddy Creek began about March 15 with water flowing under the ice on the creek. By March 27, most of the ice on the creek had broken up and water was moving freely. For several days in late March, water flowed across the Muddy Creek flats bypassing the diversion structure and the USGS gage located there. Therefore the USGS stream flow reading for that period must be considered a minimum figure. Actual flow collected from Muddy Creek during this time is estimated to be 1,500 acre feet more than was recorded. The creek continued to run through the spring and early summer but flow declined to less than 0.5 CFS by mid-August.

Because of low levels on Medicine Lake and snow cover during January-March, oxygen levels fell to near zero in parts of the lake. A substantial fish-kill resulted. Thousands of dead fish, mostly carp, lined the lake shore after ice-out on April 17. On November 19, gates at Dam #4 were opened to flush accumulated silt from the structure and approach channel. During the 10 days the gates were open, an estimated 185 acre feet of water was discharged from the lake.

Table 8.

MEDICINE LAKE GAGE READINGS IN 1989

Mgt Level	Old Gage Elevation	New Gage Elevation	Difference From Optimal Level	Water Deficit in Acre Feet
MONTH	1942.91 MSL	1935.77 MSL		
January	1939.60*	1932.46	-3.31	24,185
February	1939.60*	1932.46	-3.31	24,185
March	1940.96	1933.82	-1.95	16,492
April	1941.68	1934.54	-1.23	11,152
May	1941.70	1934.56	-1.21	10,906
June	1941.50	1934.36	-1.41	12,513
July	1941.16	1934.02	-1.75	15,079
August	1940.68	1933.54	-2.23	18,348
September	1940.24	1933.10	-2.67	20,924
October	1940.04	1932.90	-2.87	22,060
November	1940.10	1932.96	-2.81	21,744
December	1940.10	1932.96	-2.81	21,744

*Estimated level; water below gage.

Homestead Lake

The year began with Homestead Lake very low. Diversions of water from Muddy Creek to Homestead Lake began 13 March. Inflows from Sheep Creek and Lost Creek were substantial this year also. The Sheep Creek subunit was filled to capacity by 23 March and the Breaser unit was filled on 29 March.

On 23 June, stoplogs were pulled at the main Homestead discharge structure to lower the unit for botulism control. By 13 July, the lake had been drained down to spillway level. Because of the fall

DU construction project Homestead Lake did not receive any water discharge from Medicine Lake in the fall. The following table shows water levels throughout the year.

Table 9.

HOMESTEAD LAKE GAGE READINGS IN 1989

	Old Gage Elevation	New Gage Elevation		
Management Level MONTH	1937.65 MSL	1930.41 MSL	Difference from Optimal Level	Water Deficit In Acre Feet
January	1933.00*	1925.76*	-4.65	7,509
February	1933.00*	1925.76*	-4.65	
March	1934.80	1927.56	-2.85	
April	1937.00	1929.76	-0.65	
May	1936.24	1929.00	-1.41	
June	1935.60	1928.36	-2.05	
July	1933.30	1925.06	-4.35	
August	1933.00	1925.76	-4.65	
September	**	**	**	
October	**	**	**	
November	**	**	**	
December	1933.00*	1925.76*	-4.65	7,509

* Estimated level

** Lake levels below gage

Lake 12

Inflow from Lake Creek was insufficient to fill Lake 12 in 1989. There was no discharge from the lake downstream to Lake 11 or to Katy's Lake.

Table 10.

LAKE 12 GAGE READINGS IN 1989

	Old Gage Elevation	New Gage Elevation	Difference From Optimal Level	Deficit in Acre Feet
Management Levels	1951.00 MSL	1948.51 MSL		
<u>MONTH</u>				
January	1950.00*	1942.51*	-6.00	2155
February	1950.00*	1942.51*	-6.00	
March	1952.40	1944.91	-3.60	
April	1954.22	1946.73	-1.78	
May	1954.06	1946.57	-1.94	
June	1953.76	1946.27	-2.24	
July	1953.03	1945.54	-2.97	
August	1952.42	1944.93	-3.58	
September	1951.92	1944.43	-4.08	
October	1951.44	1943.95	-4.56	
November	1951.59	1944.10	-4.41	
December	1951.60	1944.11	-4.40	1580**

* Estimate, water below gage

** Estimated water deficit

Katy's Lake

There were no diversions to Katy's Lake in 1989. Water levels in the lake remained below the gage throughout the year. Although a small amount of runoff water from the surrounding area collected in the basin, it was not sufficient to meet objectives. Water deficiency for the unit remained at 1850 acre feet throughout the year.

Lake 11

Flows from Cottonwood Creek were sufficient to fill Lake 11 to management level by 29 March. An undetermined amount of water flowed on downstream to Lake 10. With no additional inflow during the summer, Lake 11 dropped rapidly and was mostly dry by late September. Rain in late October added a minor amount of water to the unit.

Table 11.

LAKE 11 GAGE READINGS IN 1989

Mgt Levels	Old Gage Elevation 1953.00	New Gage Elevation 1945.53	Difference From Optimal Level	Water Deficit in Acre Feet
<u>MONTH</u>				
January	1949.88*	1942.41*	-3.12	438
February	1949.88*	1942.41*	-3.12	
March	1953.20	1945.73	+0.20	0
April	1952.52	1945.05	-0.48	
May	1951.90	1944.43	-1.10	
June	1951.66	1944.19	-1.34	
July	1951.10	1943.63	-1.90	
August	1950.56	1943.09	-2.44	
September	1949.98	1942.51	-3.02	
October	1949.68	1942.21	-3.32	
November	1949.84	1942.37	-3.16	
December	1949.88	1942.41	-3.12	438

* estimate

Lake 10

Lake 10 received sufficient flows from Lake Creek and Sand Creek to fill the unit by 27 March. Excess waters were bypassed to Sayer Bay unit and Gaffney Lake. For a few days in late March and early April the unit exceeded desired operating levels by several inches.

Table 12.

LAKE 10 GAGE READINGS IN 1989

Mgt. Level	Old Gage Elevation 1945.80 MSL	New Gage Elevation 1938.66 MSL	Difference From Optimal Level	Water Deficit in Acre Feet
<u>MONTH</u>				
January	1943.00*	1935.86*	-2.80	904
February	1943.00*	1935.86*	-2.80	
March	1947.10	1939.96	+1.3	
April	1945.74	1938.60	-0.06	
May	1945.88	1938.74	+0.08	
June	1945.66	1938.52	-0.14	
July	1944.98	1937.84	-0.82	
August	1944.31	1937.17	-1.49	
September	1943.44	1936.30	-2.36	
October	1943.25	1936.11	-2.35	
November	1942.76	1935.62	-3.04	
December	1942.80	1935.66	-3.00	968

* estimate

Gaffney Lake

Although a substantial amount of water was passed from Lake 10 to Gaffney Lake, it was not sufficient to raise the lake to gage level. The lake remained below the discharge gate all year. The information in the table below is based on estimates.

Table 13.

GAFFNEY LAKE LEVELS IN 1989

<u>Mgt. Level</u> <u>MONTH</u>	<u>Old Gage</u> <u>Feet Above MSL</u>	<u>New Gage</u> <u>Feet Above MSL</u>	<u>Difference</u> <u>From Optimal</u> <u>Level</u>	<u>Water</u> <u>Deficit in</u> <u>Acre Feet</u>
	1945.80	1938.66		
January	1940.5	1932.48	-4.52	2851
February	1940.5	1932.48	-4.52	
March	1941.5	1933.48	-3.52	
April	1942.0	1933.98	-3.02	
May	1942.5	1934.48	-2.52	
June	1942.0	1933.98	-3.02	
July	1942.0	1933.98	-3.02	
August	1941.5	1933.48	-3.52	
September	1941.0	1932.98	-4.02	
October	1941.0	1932.98	-4.02	
November	1941.0	1932.98	-4.02	
December	1941.0	1932.98	-4.02	2599

Sayer Bay

Inflows from Lake 10 to Sayer Bay were sufficient to fill the unit to operating level. Some discharge from Sayer Bay to Medicine Lake occurred in late March.

A serious avian botulism outbreak occurred in Sayer Bay in late August. About 700 birds were picked up during the die-off. No discharges of water were made to control the problem. More consideration will be given to that option when botulism outbreaks occur there in the future.

Table 14.

SAYER BAY GAGE READINGS IN 1989

	Old Gage	New Gage		
	Elevation	Elevation	Difference	Water
Mgt. Level	1945.80 MSL	1938.66 MSL	From Optimal	Deficit in
<u>MONTH</u>			<u>Level</u>	<u>Acre Feet</u>
January	1940.34*	1933.00*	-5.66	711*
February	1940.34*	1933.00*	-5.66	
March	1945.70	1938.36	-0.30	
April	1946.04	1938.70	+ .04	
May	1945.48	1938.14	- .52	
June	1945.14	1937.80	- .86	
July	1944.54	1937.20	-1.46	
August	1943.86	1936.52	-2.14	
September	1943.32	1935.98	-2.68	
October	1943.20	1935.86	-2.80	
November	1943.10	1935.76	-2.90	
December	1943.10	1935.76	-2.90	500

* estimate

Long Lake

Long Lake received no inflow in 1989. Except for a few acres of water a few inches deep in the center of the basin, the lake was mostly dry this year. Medicine Lake water level was higher than Long Lake after inflows to Medicine Lake in March and April. It appeared that seepage from Medicine Lake was occurring in early summer. However, this spring-like flow was never sufficient to benefit water levels in Long Lake. At both the beginning and the end of the year the water deficit in the lake was estimated at 377 acre feet.

Deep Lake

Deep Lake was filled to operating level from Lake 10 during March. The lake declined throughout the summer and was below gage level by mid-August.

In November work began on a new float gage to be installed on the north shore of the lake. When completed in 1990 this gage should provide better water level records than the present gage which is located at the inlet structure.

After ice cover was established, several depth readings were taken in the lake. Measurements indicate that the lake is 12 to 15 feet deep when at operating level.

Table 15.

DEEP LAKE GAGE READINGS IN 1989

<u>Mgt. Level</u>	<u>Old Gage Elevation</u>	<u>New Gage Elevation</u>	<u>Difference From Optimal</u>	<u>Water Deficit in</u>
<u>MONTH</u>	<u>1945.80 MSL</u>	<u>1938.66 MSL</u>	<u>Level</u>	<u>Acre Feet</u>
January	1942.00*	1934.86	-3.80	376
February	1942.00*	1934.86	-3.80	
March	1946.50	1939.36	+.70	
April	1945.96	1938.82	-.16	
May	1945.52	1938.38	-.28	
June	1945.22	1938.08	-.58	
July	1944.60	1937.46	-1.20	
August	1944.00	1936.86	-1.80	
September	**	**	**	
October	**	**	**	
November	**	**	**	
December	1943.00*	1935.86*	-2.80	277

* Estimate; water below gage level

** No readings taken; water below gage level

F. Water Quality Monitoring

No water quality readings were taken on any refuge lakes in 1989.

II. RECOMMENDATIONS AND OBJECTIVES FOR WATER MANAGEMENT IN 1990

A. General recommendations for refuge impoundments and water management

1. Fill all refuge impoundments as early as possible to ensure retaining appropriated flow from spring run-off.
2. Fill upper impoundments with waters from Lake Creek, Sand Creek and Cottonwood Creek before allowing these waters to enter Medicine Lake.
3. Provide for as much flushing action as possible with available spring and summer run-off. This will improve water qualities by reducing salinity.
4. Continue to collect water quality information by taking salinity and conductivity readings for all major water flows entering or being discharged from the refuge. Spring and late fall readings should be collected, as in the past, for all major impoundments. The collection of this data will document any changes in water quality occurring over the years.
5. Monitor all stream and lake gages at least weekly during spring runoff and monthly thereafter to insure accurate measurement of water use.

B. Water Use Priorities

Table 16 shows the priority of water use on the refuge. Priority 1 impoundments should be filled and maintained before priority 2 impoundments.

TABLE 16.

PROPOSED WATER USE PRIORITY

UNIT	PURPOSE	PRIORITY
Lake 12	Nesting, brooding, storage	1
Katy's Lake	Nesting, brooding, storage	1
Lake 11	Nesting, brooding, storage	1
Lake 10	Nesting, brooding, storage	1
Gaffney Lake	Nesting, brooding, storage, fishery	2
Deep Lake	Nesting, brooding, storage	1
Long Lake	Nesting, brooding, storage	2
Sayer Bay	Nesting, brooding, storage	1
Medicine Lake	Nesting, brooding, storage, fishery	2
Sheep Crk. Dam	Nesting, brooding, storage	1
Breaser Dam	Nesting, brooding, storage	1
Homestead Lk.	Nesting, brooding, storage	1

B. Specific Recommendations and Objectives for Individual Impoundments for 1990.

1. Homestead Lake

This impoundment is basically dry and will require approximately 7,500 acre feet of water to meet management objectives. All flows from Sheep Creek, Lost Creek and Big Muddy Creek will be diverted into this impoundment until it is filled. If spring water flows appear to be below normal again, all available water flows from the Big Muddy will be allowed to bypass the diversion structure and continue down Big Muddy Creek. It will then be diverted into Homestead Lake until it is brought up to the full operational elevation of 1930.41. With completion of the cross dike dividing Knudsen Bay from the remainder of the lake, water management will change from the past. If water supplies are short, the north part of the lake will have priority for filling. If adequate flows are available to fill both Homestead and Medicine Lake, flushing of will be accomplished by diverting water into Medicine Lake and then releasing water through structure #6 back into the Muddy Creek drainage.

Specific Objectives for Homestead Lake in 1990

- a. Waterfowl breeding pair habitat will be optimum at spring operational level.
- b. Over-water nesting sites in emergent vegetation for waterfowl, grebes, and black-crowned night herons will be optimum at spring operational levels.
- c. Constructed nesting islands will provide secure nesting sites for geese and other waterfowl at spring operational levels.
- d. Aquatic vegetation should flourish in this relatively shallow impoundment.
- e. To reduce the hazard and severity of avian botulism, Knudsen Bay will be drawn down beginning in late June. The volume of water released must be controlled to prevent flooding the access crossing to hay fields downstream. Water will be retained in the North Bay. If botulism occurs there water will be removed from the stands of emergent shoreline vegetation which seem to contribute to the severe botulism outbreaks.
- f. If water levels permit, a release of water from Medicine Lake in mid-September will be diverted into Homestead Lake. Bring levels back up to a minimum of 1926.76 elevation to provide adequate fall migration habitat for waterfowl. Approximately 2,000 acre feet of water from Medicine Lake will be required to accomplish this objective.
- g. Soil exposed by DU construction work will be reseeded with a DNC mix in the spring.

2. Lakes 10, 11, 12, Gaffney Lake & Long Lake

Water levels for this series of water units are all dependent on spring run-off from Cottonwood, Sand and Lake Creeks. The present water level of these units range from 3.0 to 4.4 feet below management levels. Upstream impoundments will be filled first, then each impoundment below. If flows are adequate, water control structures will be opened rather than relying on spillways. This provides the best flushing action, and allows for the reduction of accumulated salinity in these units.

Specific Objectives To Be Met In 1990

- a. If spring run-off is adequate, all impoundments will be filled to operational levels as early as possible.

b. If water reaches operational levels, breeding pair habitat for waterfowl will be maximized.

c. At operational levels, constructed and natural nesting islands will remain secure, and yet minimize erosion by wind and wave action.

d. No water releases or drawdowns will be accomplished unless demanded by outbreaks of botulism. By maintaining water levels as close to operational level as possible, brood habitat will be optimized. After loss to evaporation and seepage, levels will remain adequate for fall migration.

f. Lakes 10 and Gaffney have been historic sites for avian botulism. Rapid flooding of shallow areas following heavy summer rain storms seems to trigger outbreaks in these impoundments. These outbreaks can be minimized or the severity reduced by maintaining constant water levels. If a serious outbreak of botulism occurs in these units, consideration will be given to drawing the units down.

e. When Lake 10 reaches management level, water will be passed first to Sayer Bay and Deep Lake then to Gaffney Lake after Sayer Bay and Deep lake are filled.

3. Katy's Lake and Deep Lake

These two natural sumps do not have outlets providing the option of flushing and are the most alkaline on the refuge. Limited surface drainage and diverted water from the spring run-off are the only source of fresh water for these two marsh units.

Specific Objectives To Be Met In 1990

a. If water is available, Katy's lake should be filled to maximum operational levels before any discharges are made from Lake 12 to Lake 11.

b. Katy's Lake has a history of botulism. Rapid rises in mid-summer water levels must be prevented to alleviate losses.

c. Deep Lake should be filled to operational level to maximize breeding pair and brood habitat.

4. Sayer Bay

This is an excellent waterfowl production unit and provides excellent migrational habitat as well. Severe avian botulism outbreaks have occurred in this area, however, and is a yearly concern on this unit.

Specific Objectives for Sayer Bay

a. To maximize breeding pair and brood habitat, the unit will be filled to management level of 1938.66 if water is available.

b. This impoundment will be closely monitored for avian botulism. With the large number of waterfowl and broods utilizing the area, the potential for significant botulism losses is high. If a major outbreak occurs, it is recommended to pull stop logs, and quickly draw the water level down to about the 1935.0 elevation. At this elevation the shallow water along the edge is eliminated. This method was used effectively to reduce losses in 1984. Prevention of rapid increases in water levels, following heavy mid-summer thunderstorms, is desirable. Reflooding of shallow vegetated mud flats can trigger an avian botulism outbreak.

5. Medicine Lake

The mid-winter 1990 elevation of the lake was 1932.96, 2.81 feet below the operational level of 1935.77. This will require about 22,000 acre feet of water to meet management objectives. Since Medicine Lake is a priority 2 impoundment, it will receive run-off from tributaries only after all other impoundments are filled. Once Homestead Lake reaches operational level in the spring, all available waters from the Big Muddy Creek will be diverted into Medicine Lake. If run-off exceeds this 22,000 acre feet, it is recommended to allow the maximum level to reach an elevation of 1936.0. At about this level, water will spill over the Dam 4 spillway until slowly receding to the 1935.77 level. If levels exceed the 1936.0 elevation, the Dam 4 water control structure should be opened to reduce the volume of water flowing over the spillway.

If heavy summer thunderstorms produce heavy silt laden waters in Big Muddy Creek, these waters may be prevented from entering Medicine Lake by opening the #1 structure on Big Muddy Creek and closing the diversion canal. This will alleviate sediment deposits on the west end of Medicine Lake.

Objectives for Medicine Lake

By filling Medicine Lake to an elevation of 1936.00 feet in the early spring, and allowing it to recede to 1935.77 by early summer, the following objectives will be met.

a. Waterfowl breeding pair habitat will be adequate. Water levels in emergent vegetation will provide nesting locations for over-water nesters including diving ducks, grebes, and black-crowned night herons.

b. Natural islands will be secure and provide nesting sites for geese, pelicans, cormorants, and great blue herons.

c. After normal water loss during the summer, early fall water levels will still be adequate to allow water to be released to Homestead Lake. This will provide desirable migrational waterfowl habitat on both Homestead and Medicine Lake. This slightly reduced water level at Medicine Lake will still provide adequate water depth to protect the over-wintering fish population.

d. This elevation will provide excellent early spring northern pike spawning habitat in the emergent vegetation stands west of Highway #16.

e. Erosion of islands and shorelines by wave action will not be excessive. This level has been commonly reached in past years without causing excessive erosion.

C. Construction, Repair, Maintenance and Rehabilitation

A number of projects are planned for 1990 on water management facilities. Following is a list and brief description of each proposed project.

Homestead Lake: Repair spalled and eroded concrete on the Dam 6 discharge structure. Clear dead trees along the main dike.

Sheep Creek Bay: Install a concrete slab on the spillway road crossing.

Medicine Lake: Install a concrete boat ramp near the Dam 4 water control structure. Relocate the lake float gage if it is found to be influenced by headquarters well 2.

Gaffney Lake: Install stainless steel stoplog slots in the main discharge water control structure. Modify the discharge WCS to permit widening the county road that crosses the structure. Install a new lake gage at the resurveyed elevation. Install a concrete boat ramp.

Deep Lake: Complete the installation of the float gage on the main part of the lake. Dismantle and remove the remains of the old WCS on the channel southeast of the lake.

Lake 10: Install a concrete boat ramp.

Katy's Lake: Adjust the lake gage to the 1988 resurveyed management elevation.

D. Other Planned or Needed Actions

Preliminary work will begin this year in preparation of a comprehensive long range water management and monitoring plan. Although a lot of notes, reports, memos and other documents have been written over the years, a good reference and guiding plan is not now available. Such a plan, properly prepared, could greatly simplify preparation of the Annual Report/Plan.

In 1989 the Region 6 Water Resources office prepared surface area and capacity tables for Medicine Lake and Sayer Bay. These are excellent references for determining amounts of water stored and water deficits. Storage and water deficits for the other refuge lakes are estimated. It would be of great benefit to the refuge water management program if area and capacity tables could be developed for all the refuge lakes.

WATER MANAGEMENT PLAN/
USE REPORT
SHORT FORMWibaux County
Lamesteer NWR

9/11/89

Station Name

Date of Inspection

39G-W-183105-00

Lamesteer Creek

Water Right No.

Source(s)

1989

Water Diverted: Yes ☒ No ☐Means of Diversion Dam
Rate 647 acre feet/year*Impoundment(s): Yes ☒ No ☐Water Level
(Elevation or Est. Storage Amount)

*Well(s):

Free Flowing gpmPumped gpm

Type of Use:

Surface Irrigation (Crop) Fish & Wildlife ☒ Stock Domestic Other

Overall Climactic Conditions: Good runoff in spring of 1989 filled the unit.

Condition of Facilities: Fair to poor, dam needs repair.

Proposed Water Program: Store available runoff; excess water will flow over spillway.

Comments: The dry winter of 1989/90 will produce no runoff to Lamesteer Lake.

*If more than one impoundment or well, please attach additional

WATER MANAGEMENT PLAN/
USE REPORT
SHORT FORMSheridan County
NE Montana WMD
Carlson WPA

4/2/90

Station NameDate of InspectionApplied for - not recievedUnnamed CouleeWater Right No.Source(s)

1989

Water Diverted: Yes X No Means of Diversion DamRate Natural flow up to 40acre feet.*Impoundment(s): Yes X No Water Level Dry

(Elevation or Est. Storage Amount)

*Well(s):

Free Flowing gpmPumped gpm

Type of Use:

Surface Irrigation (Crop) Fish & Wildlife XStock Domestic Other

Overall Climactic Conditions: Winter/spring of 1988-89 produced minimal runoff; estimated to be less than 10 AF.

Condition of Facilities: Good

Proposed Water Program: Store available runoff. Water level is dependent upon a culvert in Montana Highway #16.

Comments: The dry winter of 1989/90 will produce no runoff to this unit.

*If more than one impoundment or well, please attach additional

1989/90

WATER MANAGEMENT PLAN/
USE REPORT
SHORT FORMRoosevelt County
NE Montana WMD
Johnson Lake WPA

4/2/90

Station Name

Applied for - Not Received

Water Right No.Date of Inspection

Unnamed Coulee

Source(s)

1989

Water Diverted: Yes ☒ No ☐Means of Diversion Dam
Rate Natural flow of 200 CFS up
to 1,050 acre feet*Impoundment(s): Yes ☒ No ☐Water Level Dry
(Elevation or Est. Storage Amount)

*Well(s):

Free Flowing _____ gpm

Pumped _____ gpm

Type of Use:

Surface Irrigation _____
(Crop) _____Fish & Wildlife ☒ _____

Stock _____

Domestic _____

Other _____

Overall Climactic Conditions: Winter/spring of 1988/89 produced
minimal runoff; estimated to be less than 200 AF.

Condition of Facilities: Good

Proposed Water Program: Store available runoff and flush if surplus
water is available.

Comments: A dry winter in 1989/90 will produce no runoff to this unit.

*If more than one impoundment or well, please attach additional